

PCT / IN 04 / 00243

REC'D 09 MAR 2005

WIPO PCT



INTELLECTUAL
PROPERTY INDIA
PATENTS / DESIGNS / TRADE MARKS /
GEOGRAPHICAL INDICATION



सत्यमेव जयते

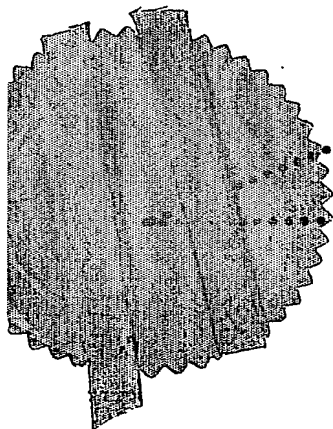
Government Of India
Patent Office
Todi Estates, 3rd Floor,
Lower Parel (West)
Mumbai - 400 013

THE PATENTS ACT, 1970

IT IS HEREBY CERTIFIED THAT, the annex is a true copy of Application and Complete Specification filed on 13/08/2003 in respect of Patent Application No.802/MUM/2003 of IMPETUS Project, OIL AND NATURAL GAS CORPORATION LIMITED., MUMBAI REGION, 634, VASUDHARA BHAVAN, BANDRA(E), MUMBAI -51, MAHARASHTRA, INDIA.

This certificate is issued under the powers vested in me under Section 147(1) of the Patents Act, 1970.

.....
Dated this 18th day of January 2005.




(R. BHATTACHARYA)

ASST. CONTROLLER OF PATENTS & DESIGNS

BEST AVAILABLE COPY

**PRIORITY
DOCUMENT**
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

FORM 1

THE PATENTS ACT, 1970
(39 OF 1970)

APPLICATION OF GRANT OF A PATENT
[See section 7]

(a) We, IMPETUS Project OIL AND NATURAL GAS CORPORATION LIMITED.,
MUMBAI REGION, 634, VASUDHARA BHAVAN, BANDRA(E), MUMBAI-51,
MAHARASHTRA, INDIA

(b) Indian National

2.
(a) hereby declare that We are in possession of an invention titled as – **LIQUID SEAL FOR DIVERTING HIGH PRESSURE FLARED GAS TO LOW PRESSURE FLARED GAS AND RECOVERY OF LOW PRESSURE GAS.**

(b) that the complete specification relating to this invention is filed with this application.

(c) that there is no lawful ground of objection to the grant of a patent to us.

3. further declare that the inventors for the said invention are

(a) **MR. PADAM SINGH**

(b) Indian Nationals.

4. That our address for service in India is as follows :

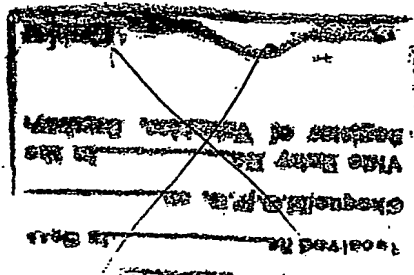
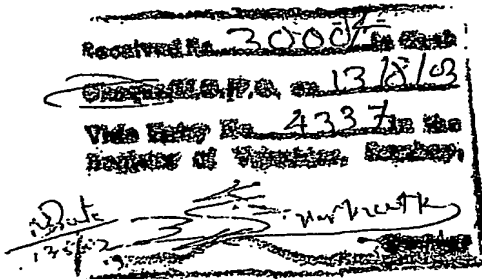
M/s M.P. MIRCHANDANI & CO.,
57, Sneh Sadan, COLABA,
MUMBAI-400 005.

5. Following declaration has been given by the inventor(s), declare that the applicant herein are our assignee or legal representative

(a) **MR. PADAM SINGH**

6. That to the best of our knowledge, information and belief the fact and matters stated herein are correct and that there is no lawful ground of objection to the grant of patent to us on this application.

802/MUM/2003 with RA 1255
13/8/2003



7. Following are the attachment with the application :

- (a) Complete specification (3 copies)
- (b) Drawings (3 copies)
- (c) Statement and undertaking on FORM-3
- (d) Power of authority.
- (e) Fee Rs. 5,000/- in cheque / bank draft bearing No. _____
date _____ on _____.

We request that a patent may be granted to us for the said invention.

To
The Controller of Patents
The Patents Office
at MUMBAI.


22/7/03
PADAM SINGH

PADAM SINGH
HEAD IMPETUS, ONGC,
634, Vasudhara Bhawan
Bandra (E), Mumbai-400051

Complete Specification

LIQUID SEAL FOR DIVERTING HIGH PRESSURE FLARED GAS TO LOW PRESSURE FLARED GAS AND RECOVERY OF LOW PRESSURE GAS

Padam Singh, General Manager(Production), Head IMPETUS, Oil and Natural Gas Corporation Ltd., Mumbai, INDIA.

ABSTRACT

In oil processing industries, there are high pressure gases and low pressure gases being flared because of technical reasons. At some of the process facilities, industries maintain low pressure and high pressure flares separately. The low pressure and high pressure gases generally liberates from the following systems at oil & gas handling facilities :

Gas from Low Pressure System

- a. Produced Water Conditioner
- b. Sump Cassion.
- c. Seal Oil of Process Gas Compressors.
- d. Glycol Scrubber in Gas Dehydration Units.

Gas from High Pressure System

- a. Venting of Safety Valves.
- b. Blow downs
- c. Compressors Suction and Discharge Manifolds.

In the process, there are knock-out drums (KODs) at the process facilities which are placed in high pressure and low pressure flare lines before gas is released to the flare stacks.

applicati
By installing the liquid seal after the flare KODs, the gas which is technically flared can also be recovered. In the liquid seal, the water can be used and back pressure in the flare line can be generated very easily between 0.1 kg/cm² to 1 kg/cm² which can facilitate recovery of very low pressure gas. The recovery of low pressure gas is made possible only by providing the liquid seal and with this approach the concept of zero gas flaring can be achieved. During any upset in a system, the liquid will break and the liquid gets collected in a liquid holder allowing the gas to go to the flare stack.

up 21

02/MUM/2003

13-8-03

Since any valve can not be allowed in the flaring, introducing liquid seal is the only solution by means of which the low pressure gas recovery is possible.

INTRODUCTION

In all the process facilities, the flaring of gas was considered unavoidable since there was no foolproof system available to restrict the gas from going to flare stack. Generally, the technical gas flaring in oil industries is in the range of 10,000 Cub.M/day to 50,000 Cub.M/day at each oil and gas handling facility. However, it depends upon the complexity of the particular facility. The gas being flared in oil industries is generally very rich with heavy hydrocarbons. Therefore, on recovery of flared gas if put to the process stream, it produces more value products.

The flare pipelines are always installed in a slope upto the flare knock out drums (KODs) to avoid pockets in the long length pipeline for any liquid. The liquid pocket in long length pipeline may create more back pressure in case of more gas flaring due to upset in the process. Therefore, the pocket upto KODs are not allowed as per the conventional process design. The liquid carried out in the process get arrested in the KODs and only gas coming out from KODs are to go to the vertical flare stack without carry over of any liquid.

The liquid (water) seal is designed which is installed after KODs. These liquid seal have self content liquid holder which holds the total liquid of the seal when it get break and in such situation only gases go to the flare stack. The liquid is made with a loop line which contains water or any other liquid. It is installed by providing the blind in the flare piping before flare stack. The gas route in such situation also does not have any restriction / valve in the pipings except this liquid column in the seal of desired level which breaks within second. The installation of such seal does not violate the process design safety norms of the process facilities.

Depending upon back pressure requirement for recovery of flared gas, the liquid seal (piping loop filled with water) is designed. For example, if for Low Pressure gas recovery the pressure requirement is 0.5 kg/cm² the liquid in the liquid seal is design in such manner so that the water in loop stands with 5 Meters water column. Likewise, the piping loop and liquid holder are designed depending upon upstream pressure requirement, suction pressure requirement for Low Pressure gas recovery system as well as size of flare pipe.

ADVANTAGES OF NEW DESIGNED LIQUID (WATER) SEAL

In the oil industries, the flared gases can be recovered only by introducing the pressure restriction system in the flared gas piping before it get released to the flare stack. It is understood that some of the companies in the world have design Fast Acting Valve (opening within three seconds) being installed in the Low Pressure gas flare piping after KODs, but such kind of valve can not be fully relied. Any mis-operation of such kind of valves or any kind of valves in the flaring system may create disaster. Therefore, the newly designed liquid seal is totally foolproof and does not have any kind of instrumentation. The newly designed liquid seal have the following advantages :

- a. The liquid is safe and foolproof in the gas flaring pipings.
- b. It does not require any maintenance.
- c. The operation and maintenance cost is zero. Only water is required to be filled up if the liquid level in liquid holder get reduces beyond the limit.
- d. The Low Pressure gas which is very rich with heavy hydrocarbon can only be recovered by installing newly designed liquid seal.
- e. The installation is very easy and since it does not require any maintenance it can be installed in any corner of the process facilities.
- f. The installation cost of newly designed liquid seal is less than Rs.5 Lakhs. However, this cost depends upon size of the gas flare pipeline. It is understood that the cost of Fast Acting Valve as stated above is about Rs.1 Crore.
- g. As per experience in oil industries, the Low Pressure gas which is rich with heavy hydrocarbons if recovered, the value added products value to about eight times more than the value of gas. Therefore 1 Cub.M gas if values Rs.2.23, the value Added Products from this gas value to about Rs.7.00. It is evident, that the installation of newly designed liquid seal in the flaring system only could make possible to recover very precious low pressure gas.

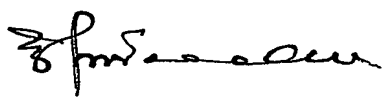
PRINCIPLE OF NEWLY DESIGNED LIQUID (WATER) SEAL

The pressure in the flare pipeline is created by installing the liquid column on gas en-route. The system is designed in such a manner so that there is no restriction in the pipeline and if there is any upset in the process, the water / liquid in the loop gets evacuated by the gas pressure and immediately get collected in the water / liquid holder as explained in Figure 1, 2, 3 & 4. After process becomes normal, the water / liquid from liquid holder comes back to the liquid seal automatically by gravity.

The liquid seal creates pressure on the following principle :

10 Meter Water column = 1 kg/cm²

The newly designed liquid seal does not have any kind of instrument and it is a simple mechanical system operates with water level. The recovery of gas by providing liquid seal in the flaring system is explained in Figure No.4.


(M.P. MIRCHANDANI)
Attorney for Applicant

LIQUID SEAL (IDLE CONDITION) FOR 0.7 Kg/cm^2 RESSURE
(NON-OPERATIONAL CONDITION)

APPL. No.

/mum/03

Total sheet: 2
Sheet No. 1

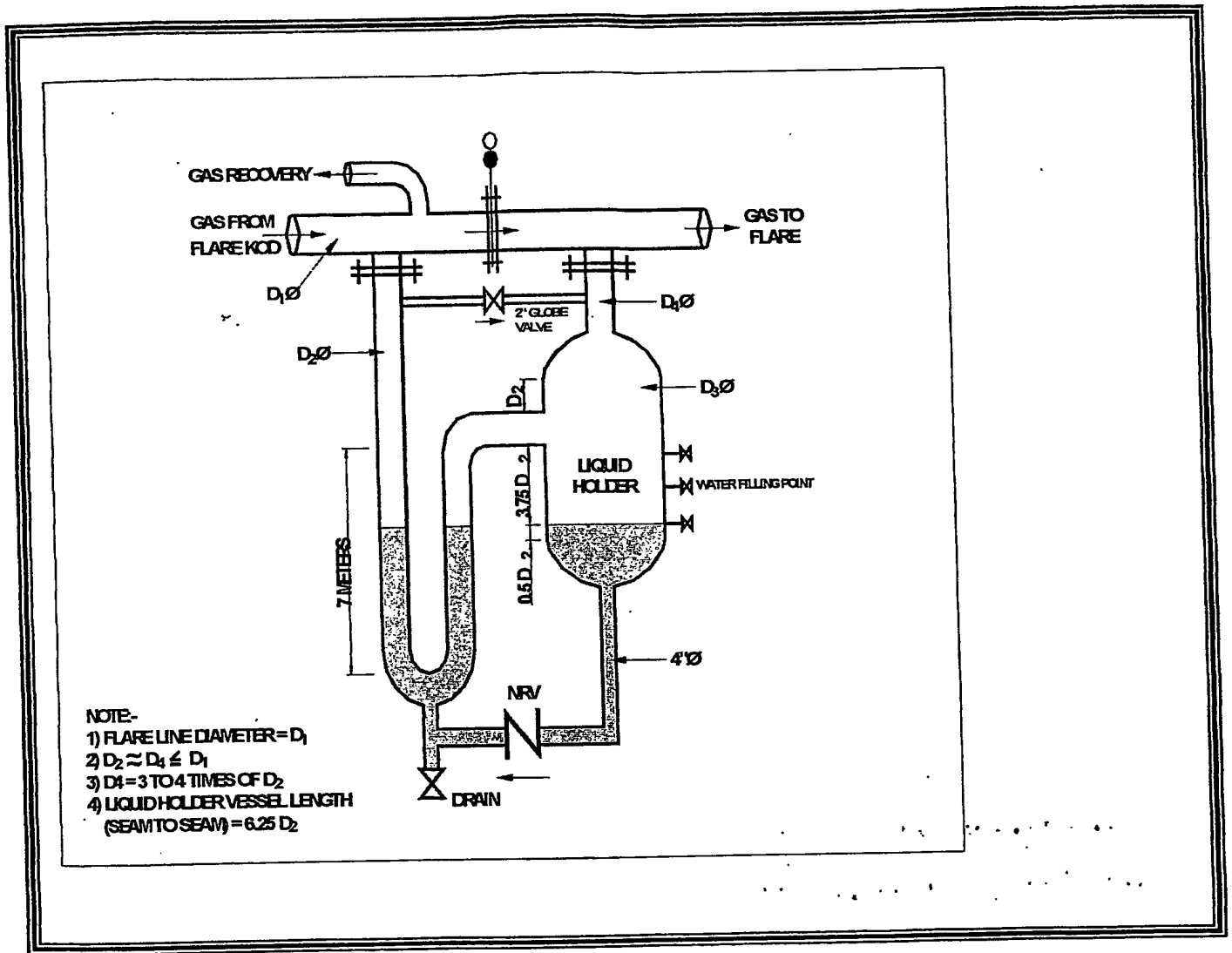


FIG.-1

M.P. Merchant
(M.P. MERCHANT)
Attorney For Applicant

LIQUID SEAL (OPERATIONAL) FOR 0.7 Kg/cm² PRESSURE (WITH GAS RECOVERY)

Appln. no.

/mum/03

Total Sheet: 4
No of Sheet: 2

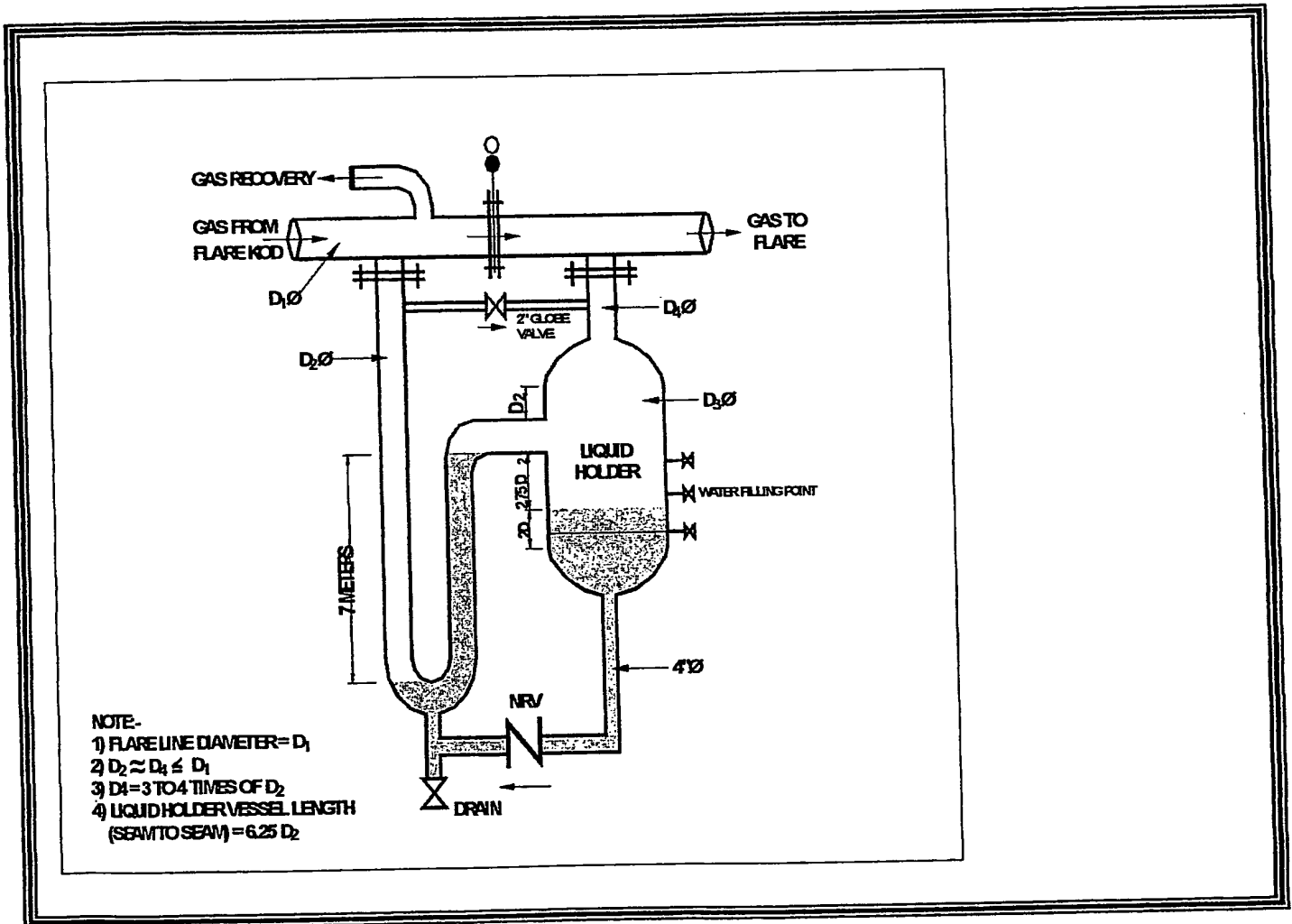


FIG.-2

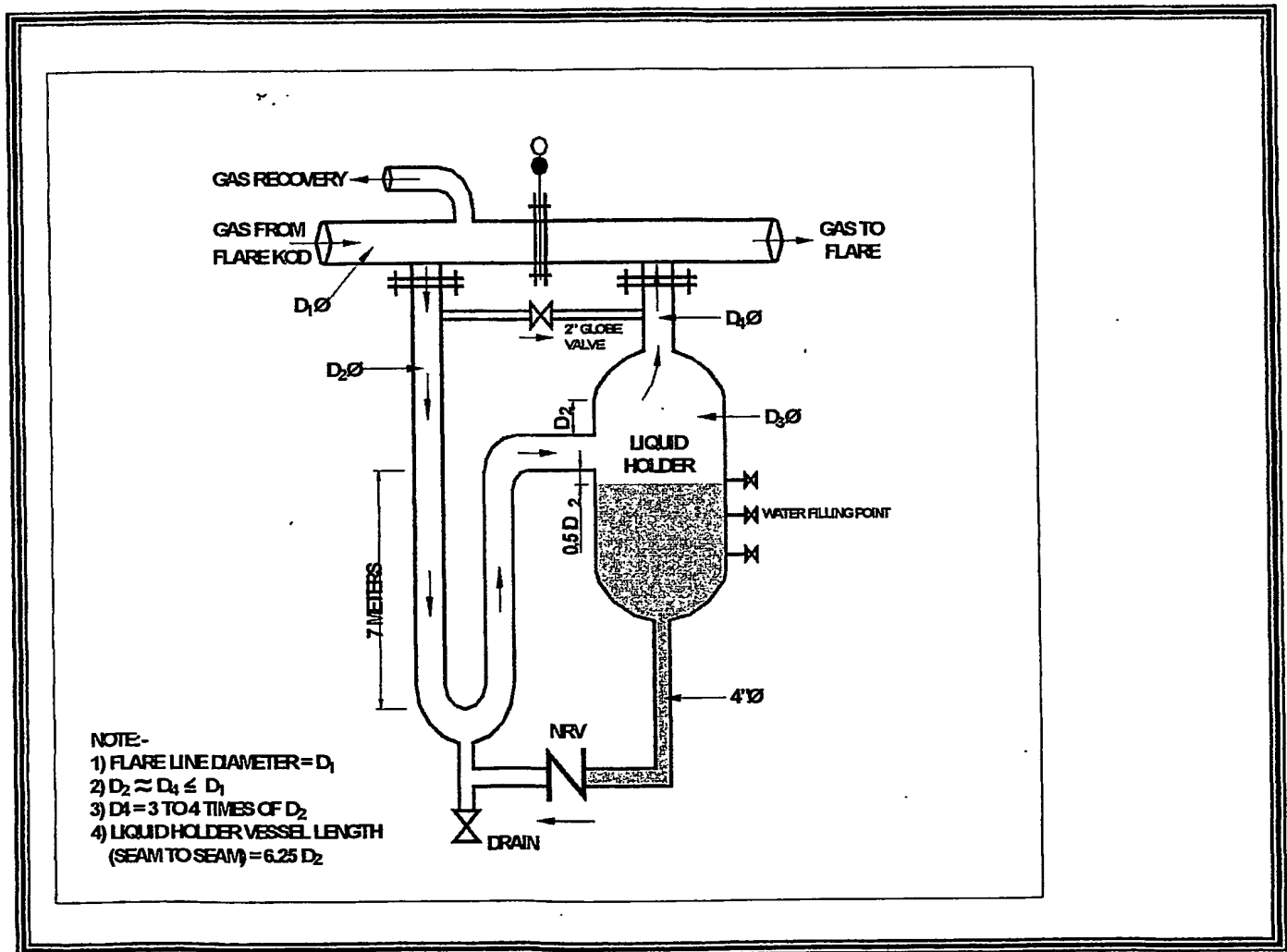
(M.P. MIRCHANDANI)
Attorney for the Applicant

LIQUID SEAL (OPERATIONAL) FOR 0.7 Kg/cm² PRESSURE
(WITHOUT GAS RECOVERY)

APPLN. NO.

1/mum/03

Total Sheets: 4
NO. OF Sheet 3



(m.p. m. Rethan DANE)
Attorney for the Applicant

FIG.-3

ACHIEVING ZERO GAS FLARING BY MEANS OF NEWLY DESIGNED LIQUID SEAL AND GAS TO GAS EJECTORS

APPL. No

/mum/03

Total Sheet 4,
No of Sheet 4

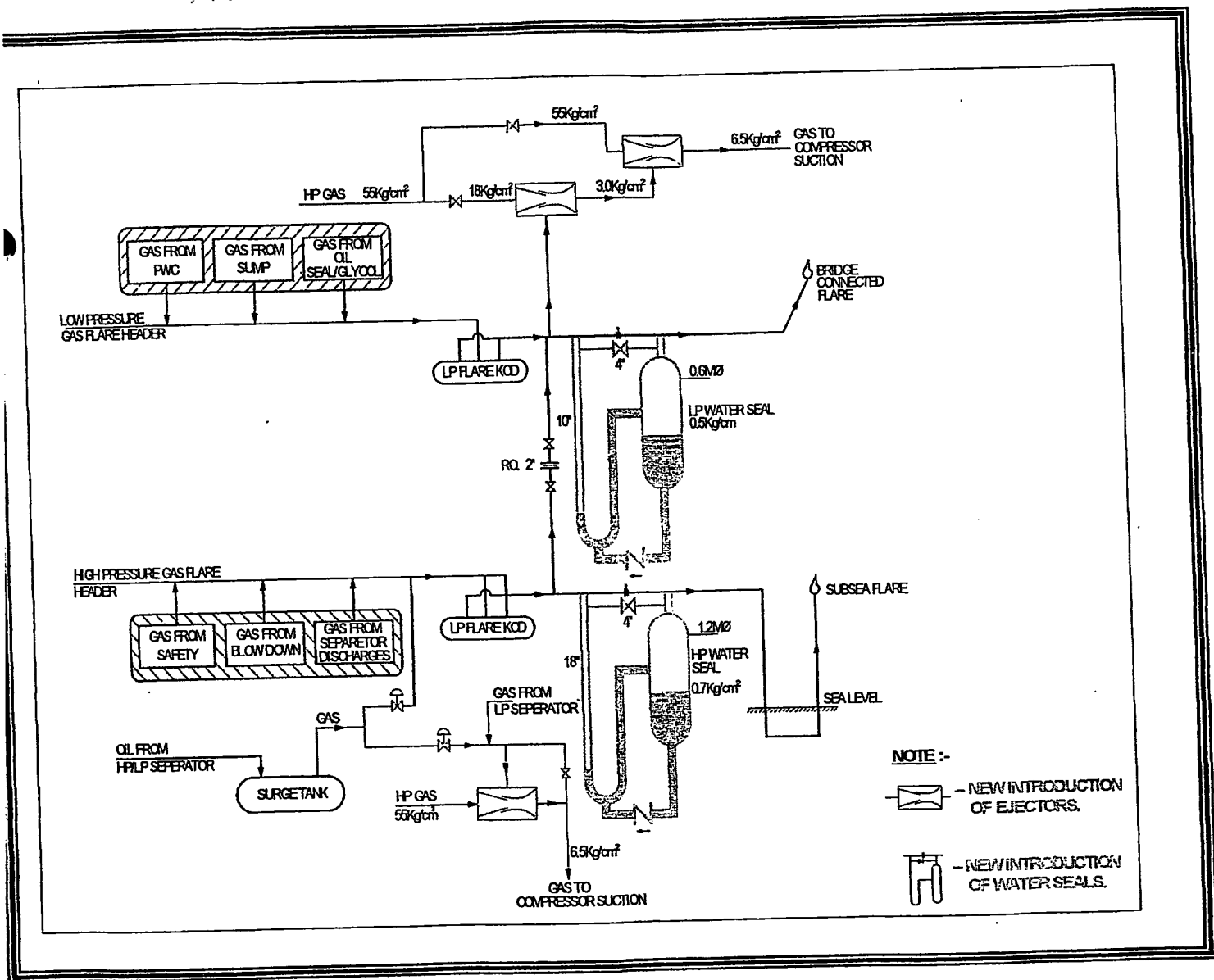


FIG.-4

(M.P. INTERMEDIATE)
Attorney for the Applicant

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☐ **BLACK BORDERS**

☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**

☐ **FADED TEXT OR DRAWING**

☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**

☐ **SKEWED/SLANTED IMAGES**

☒ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**

☐ **GRAY SCALE DOCUMENTS**

☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**

☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**

☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.